to cause these volumes of the gases to pass into their corresponding regenerators were, in a great many furnaces, nearly of equal value. On the contrary, for American furnaces, where the air passes through the port with a velocity of about 8 m per second or a little more, and the gas attains a velocity of about 58 to 60 m per second, the chimney' drafts required for the regenerators for air and for gas have very different values.

This, therefore, explains *the necessity of having different dampers or regulating valves for controlling the draft upon the regenerators for gas and those for air*.

In a general way all the computations made have confirmed this conclusion.

3. Occasionally, but very rarely, there has been found an open-hearth furnace in which the air and the gases had a hydrostatic pressure which was greater than was necessary (Lysva Works, Oural). This is due to the low velocities in the furnace and to the large size of the reversing valves employed. *M*

When furnaces of this kind are new it is necessary to work with the air and gas regulating valves partially closed. After the furnace has been in use for some time the cinders and dust commence to obstruct the checkerwork, and the supplementary resistance due to the regulating valves may be decreased. This permits the furnace to be operated with the regenerators badly obstructed.

This also explains why, in certain works, the checkerwork has to be renewed after one hundred to five hundred heats, while in other plants, the regenerators last six months or more. When there is an excess of hydrostatic pressure of the gases, there is the possibility of controlling the operation of the furnace, and of utilizing the air and gas valves as rheostats, which permits the prolonging of the campaign of the furnace. Therefore, the computation of *the hydraulics of the gas* in the open-

hearth furnace supplies the criteria for their construction. These calculations make it unnecessary to have extensive tabulations of the dimensions and proportions of actual furnaces, with which so many metallurgists burden their memories and notebooks.

(1) Strangulation of the furnace due to the small size of the reversing valves is one of the principal defects in reversing furnaces.